1107-14-163 **Patrick Graf*** (patrick.graf@uni-bayreuth.de). *The generalized Lipman-Zariski problem.*

We propose and study a generalized version of the Lipman-Zariski conjecture: let $(x \in X)$ be an n-dimensional singularity such that for some integer $1 \leq p \leq n-1$, the sheaf $\Omega_X^{[p]}$ of reflexive differential p-forms is free. Does this imply that $(x \in X)$ is smooth? We give an example showing that the answer is no even for $p = 2$ and X a terminal threefold. However, we prove that if $p = n-1$, then there are only finitely many log canonical counterexamples in each dimension, and all of these are isolated and terminal. As an application, we show that if X is a projective klt variety of dimension n such that the sheaf of $(n-1)$-forms on its smooth locus is flat, then X is a quotient of an Abelian variety.

On the other hand, if $(x \in X)$ is a hypersurface singularity with singular locus of codimension at least three, we give an affirmative answer to the above question for any $1 \leq p \leq n-1$. The proof of this fact relies on a description of the torsion and cotorsion of the sheaves Ω_X^p of Kähler differentials on a hypersurface in terms of a Koszul complex. As a corollary, we obtain that for a normal hypersurface singularity, the torsion in degree p is isomorphic to the cotorsion in degree $p-1$ via the residue map. (Received January 12, 2015)